APPENDIX IV-PAST AND CURRENT MONITORING IN THE GRYN PARK UNITS (INCLUDING DATASET CATALOG REFERENCES)

TOPIC	TITLE	DESCRIPTION	CATALOG #
YELLOWSTONE NATIONAL PARK			
Air Quality	Monitor Air Quality at Lake and Tower	NADP Stations	YELL-AQU-002, YELL-AQU-001,
Amphibians	Status and Trends of Amphibian Populations in the Greater Yellowstone Ecosystem	Assess amphibian status and distribution in YELL and GRTE based on: (1) surveys of all potential amphibian breeding sites in randomly selected hydrological units (7th level); (2) surveys for priority species (Northern Leopard Frog, Boreal Toad) and (3) population monitoring at sentinel sites. This project is part of the Dept. of Interior's national Amphibian Research and Monitoring Initiative. Assess amphibian status and distribution in YELL and GRTE based on: (1) surveys of all potential amphibian breeding sites in randomly selected hydrological units (7th level); (2) surveys for priority species (Northern Leopard Frog, Boreal Toad) and (3) population monitoring at sentinel sites. This project is part of the Dept. of Interior's national Amphibian Research and Monitoring Initiative.	YELL-HER-014
Aquatic Resources	Gibbon River sediment study	Sediment deposition is being monitored on the Gibbon River during major road reconstruction	YELL-FM-007
Aquatic Resources	Monitoring the flow regimes of remote tributaries to Yellowstone Lake	Stream water elevation is being recorded digitally every hour at 13 remote tributaries to Yellowstone Lake	YELL-FM-006
Aquatic Resources	Monitoring the thermal regimes of Yellowstone's streams and rivers	Temperatures are monitored hourly by digital temperature loggers at sites on > 50 streams	YELL-GEO-001
Aquatic Resources	Macroinvertebrate Monitoring of Streams	Monitor macroinvertebrate and habitat parameters at fisheries sampling sites	YELL-FM-015
Aquatic Resources	Native Montana Grayling Monitoring	Inventory description, abundance, and movements of fluvial grayling, primarily in the Gibbon River drainage.	YELL-TEA-002
Aquatic Resources	Soda Butte stream flow, pH, and conductivity	Monitored at a gauging station near the Northeast Entrance under the Montana-NPS Reserved Water Compact	YELL-WQ-010 YELL-WQNT-002
Aquatic Resources	Yellowstone Cutthroat Trout Monitoring	Includes Fall Gillnetting, fish traps on Clear, Arnica, and Bridge Creeks, and dip netting at LeHardy Rapids	YELL-FM-005
Aquatic Resources	Lake Trout in Yellowstone Lake Population Monitoring	Includes gillnetting, angler (separate from park wide survey), and hydroacoustic surveys	YELL-FM-013,
Aquatic Resources	Backcountry lakes monitoring program	Monitor fish populations and habitat parameters on lakes other than Yellowstone Lake	YELL-FM-015
Aquatic Resources	Streams monitoring program	Monitor fish populations and habitat parameters in Yellowstone's streams	YELL-AQU-001
Aquatic Resources	Whirling disease monitoring	Efforts primarily focus on Yellowstone Lake. Disease samples have also been collected (database developed) in conjunction with recent stream studies.	YELL-WQ-015,
Aquatic Resources	New Zealand mud snail monitoring	Monitor distribution, abundance, and spread of exotic mud snails. Public education about exotic invader through notices in angling regulations, park newspaper, and interpretive training.	YELL-ESA-002,
Aquatic Resources	Reese Creek Flow and YCT Population Monitoring	Monitor flow at Parshall flumes to ensure that irrigators leave legal in-stream flow; monitor fish populations	
Aquatic Resources	West slope Cutthroat Trout Monitoring	Inventory distribution and abundance of genetically pure west slope cutthroat trout	YELL-ICH-003 YELL-FM-009, YELL-ICH-017,
Aquatic Resources	Water quality monitoring near sewage treatment plants	Monitor groundwater quality near sewage treatment plants.	

TOPIC	TITLE	DESCRIPTION	CATALOG #
Aquatic Resources	Long term monitoring of anglers and angler success	Monitor angler effort and success in Yellowstone; includes volunteer angler report, tracking number of permits sold, Yell Lake creel surveys, volunteer cards returned and exit gate surveys	YELL-FM-010
Aquatic Resources	Developing effective ecological indicators for watershed analysis	This study is designed to develop improved indicators and innovative techniques for assisting and monitoring ecological integrity at the watershed level in the western United States. Its specific objectives are to develop practical, scientifically valid indicators that (1) span multiple resource categories, (2) are relatively scale independent, (3) address different levels of biological organization, (4) can be rapidly and cost-effectively monitored by remote sensing, and (5) are sensitive to a broad range of anthropogenic and natural environmental stressors.	
Aquatic Resources	Respiratory physiology and habitat selection in thermophilic aquatic insects	Understand respiratory physiology and habitat selection decisions in thermophilic aquatic insects including water scavenger beetles (Coleoptera: Hydrophilidae) and both adult and nymphal stages of dragonflies and damselflies (Odonata). Correlate habitat selection decisions and thermal preference with respiratory physiology and development (Odonata).	
Aquatic Resources	Food web impacts of exotic New Zealand mud snails in Yellowstone national park	Estimate carbon flow in food webs of rivers with high (Firehole River) and low (Gibbon River) densities of exotic snails	
Aquatic Resources	Development of an empirical model for predicting the stream invertebrate fauna of the Greater Yellowstone Ecosystem: A pilot study	Develop an empirical model that accurately predicts the expected invertebrate fauna in streams of the Greater Yellowstone Ecosystem. Models of this type can be used to assess the biological integrity of streams that may be impacted by anthropogenic activity.	
Aquatic Resources	Yellowstone River Basin Study Unit, National Water Quality Assessment	The overall goals of the NAWQA Program are to (1) describe current water-quality conditions for a large part of the Nation's freshwater streams and aquifers, (2) describe how water quality is changing over time, and (3) improve our understanding of the primary natural and human factors affecting the water quality.	
Aquatic Resources	Reference Stream Monitoring - Long-term Trend Sites	Collect long-term water quality, biological and stream habitat data at least-impacted streams in Yellowstone National Park. Reference stream data will be used as a benchmark for assessing water-quality, biological, and habitat conditions of test streams in the Middle Rockies ecoregion of Wyoming	YELL-WQ-004
Aquatic Resources	Biogeochemical Interactions at Environmental Interfaces (Mercury dynamics in aquatic ecosystems of Yellowstone National Park)	Total mercury and methyl mercury concentrations in Nymph Lake and nearby lakes, streams and ponds of YNP are the highest known natural concentrations in aquatic ecosystems anywhere. The objectives of this study are to understand the dynamics of mercury in these water bodies and the impacts (if any) of the high mercury concentrations on biota.	
Botany	Willow persistence	Going on in 2002	YELL-BOT-005 YELL-BOT-004, YELL-BOT-006,
Ecological processes	Food for the Masses	Wolf Predation Composition and Rate	YELL-WM-007
Ecological processes	Trophic Cascade	Elk-predator-herbivory interactions	YELL-ECO-005
Ecological processes	Predator Interactions	Wolf-lion-bear interactions	YELL-WM-008,
Ecological processes	Spawning stream surveys	Count spawners and associated bear activity in spawning tributaries to Yellowstone Lake. Summarized information used by Fisheries and Aquatic Resources to monitor cutthroat trout abundance at whirling disease test sites.	YELL-FM-001, YELL-WM-075
Ecological processes	Whitebark Pine Transects	Count cones on 19 whitebark pine transects throughout the ecosystem (10 located in YNP)	YELL-FOR-001
Ecological processes	Above- and belowground carbon allocation in developing and mature lodgepole pine forests in Yellowstone National Park	Determine the long-term effects of fire on carbon release and storage	

TOPIC	TITLE	DESCRIPTION	CATALOG #
Ecological processes	A Remote Sensing and GIS-Based Model of Habitat as a Predictor of Biodiversity	Objectives 1. Quantify the spatial and temporal variability in montane meadows.;2. Develop a spectrally-based spatially-explicit model for predicting plant and animal (butterflies and birds) species diversity patterns in montane meadows.;3. Test the spectrally-based spatially explicit model developed in Objective 2 for predicting plant and animal species diversity patterns in montane meadows	YELL-EM-004 YELL-EM-005, YELL-EM-006,
Ecological processes	Physiology and geochemical tracing of FeS/H2S micro-organisms in subsurface hydrothermal systems	To characterize the diversity of micro-organisms associated with sulfide-containing or acidic hot springs. The initial phases of the study concentrated on evidence for pyrite-forming anaerobic bacteria. Subsequent work has concentrated on recovery, preservation, and molecular analysis of thermoacidophilic archaea.	
Ecological processes	Phylogenetic Analysis of High-Temperature Ecosystems	On-going research in The Park continues to focus on the survey of microorganisms in Yellowstone microbial ecosystems with varying solution chemistries	
Ecological processes	Climatic Variation in the Greater Yellowstone Ecosystem: Evaluating the Evidence for Decade to Centennial Variability in Climate	The research proposed here is organized around the following questions and associated research strategies: Question 1: What is the nature of temperature variability over the past 1000 years	
Ecological processes	Postglacial fire frequency and its relation to long-term vegetation and climatic changes in Yellowstone Park	Postglacial fire frequency and its relation to long-term vegetation and climatic changes in Yellowstone Park	YELL-ECO-008,
Ecological processes	Aspen regeneration in northern Yellowstone National Park	Our objective was to measure aspen regenerative success inside and outside of established wolf pack territories on YNP's northern range	YELL-ECO-006 YELL-FIR-010, YELL-FIR-009,
Ecological processes	Trace element content of cervid antlers	Studying the strontium isotopic composition and the content of strontium and other trace elements in elk and deer antlers from selected national parks in the western U.S., including Yellowstone. The study will add to the general body of knowledge about the cycling of trace elements through the environment and increase our understanding of the biogeochemistry of strontium	
Ecological processes	Ungulate carrion impact on plant community composition and nutrient cycling	To determine whether wolf killed ungulate carcasses are having an impact on plant community composition and nutrient cycling	
Ecological processes	The Ecological Relationship Between a Rocky Mountain Threatened Species and A Great Plains Agricultural Pest	1.To determine where army cutworm moths (Euxoa auxiliaris) (ACMs) originate using microsatellite and mtDNA markers. 2. To determine if ACMs harbor agricultural pesticides in their tissues. 3. To determine whether ACMs from different Great Plains origins are interbreeding in high elevation sites prior to their return to agricultural areas.	
Ecological processes	Assessment of host races in the ovary-feeding beetle, Brachypterolus pulicarius (Coleoptera: Nitidulidae)	Investigating the existence of host races in the beetle, Brachypterolus pulicarius, and a natural enemy of yellow and Dalmatian toadflax. Because this beetle exists on two separate host plants, researchers are investigating whether the species consists of two genetically distinct host races	
Ecological processes	Winter wolf predation rates and prey selection in an elk-bison system in Yellowstone National Park	The goals of this study were to quantify wolf predation rates and prey selection, and assess wolf predation impacts on the ungulate populations in the Madison, Firehole, and Gibbon drainages of Yellowstone National Park. Specific objectives included: 1) estimate time ungulates were subjected to wolf predation, 2) estimated winter ungulate abundance and composition, 3) estimate temporal patterns in predation, within and between winters, 4) describe prey selection patterns, and 5) estimate total ungulate offtake by wolves according to species, sex, and age class.	YELL-WM-123

TOPIC	TITLE	DESCRIPTION	CATALOG #
Ecological processes	Development of Algorithms to Use with Satellite Images to Assess Annual Snow Melt and Green-Up In Yellowstone National Park	methodology for use in conjunction with satellite imagery to determine snow cover and green up in Yellowstone National Park that can be used on a near-real-time basis	
Ecological processes	Fire: A Force for Change and Regeneration in Natural Ecosystems	To study the long-term changes in re-vegetation at sites affected by different fire intensities, with emphasis on lodgepole pine, aspen and whitebark pine	
Ecological processes	The sustainability of grazing ecosystems	To measure the effects of grazing ungulates on aboveground and belowground production at diverse grassland sites on winter, transitional, and summer ranges	
Ecological processes	Fungi from geothermal soils and thermotolerant plants	The proposed research will provide information to increase our understanding of fungal survival in unique environments, the roles of fungi in ecosystem dynamics, and the temporal and spatial scales of the micro-habitats that fungi occupy	YELL-BOT-010
Ecological processes	Fire Effects Monitoring in Yellowstone National Park	Monitor the effects of prescribed fire on Yellowstone's ecosystems. Provide information to evaluate whether the objectives of the fire management office are met. Study the long-term effects of fire on the landscape	YELL-FIR-024
Exotics-Invertebrate	Gypsy Moth Detection Trapping	Detect spread of exotic gypsy moths	YELL-ESA-001
Geologic Resources	Quaternary geology and ecology of the Greater Yellowstone area	To determine the history of glaciation and distribution of glacial deposits; to determine the history of Yellowstone Lake and River level changes and related history of caldera inflation and deflation episodes; to determine the history of hydrothermal explosions, particularly in the Yellowstone Lake area; to determine geologic controls of plant ecology in the Greater Yellowstone area	
Geologic Resources	A Preliminary Investigation of the Eocene Palynoflora of the Yancey Creek Drainage Basin	,	
Geologic Resources	Aqueous-Solid Geochemical Process Model of Travertine Precipitation at Angel Terrace, Mammoth Hot Springs	Develop a quantitative process model that will incrementally track the diagenesis of hot spring travertine depositional facies from the modern through the Recent, Holocene, and Pleistocene. Resulting constraints on the rates and products of water-rock reactions provide the template necessary to accurately interpret travertine deposits in the early Earth and perhaps other planets	YELL-GEO-005
Geologic Resources	Sulfur speciation and redox processes in mineral springs and their drainages	Water analyses are reported for samples collected at hot springs and their overflow drainages, geysers, and ambient-temperature acid streams. Research investigations focus on sulfur redox speciation in hot springs and microbially medicated sulfur oxidation in stream waters, to document chemical changes in overflows that affect major ions, redox species, and trace elements.	YELL-GEO-004
Geologic Resources	Investigation of CO2 Emissions Related to the Yellowstone Volcanic / Hydrothermal System	1) estimate the CO2 emissions due to the Yellowstone volcanic/ hydrothermal system, ;2) monitor background temporal variability of CO2 emissions, and how variations are related to changes in hydrothermal and seismic activity,;3) study the spatial distribution of CO2 emissions and investigate controls on spatial heterogeneity of gas emissions, and;4) monitor gas chemistry including carbon and helium isotopes to gain a broader understanding of the sources of gas emissions and interactions with the hydrothermal system.	
Geologic Resources	The biogeochemistry of sublacustrine geothermal vents in Yellowstone Lake, WY	These studies will continue to focus on the microbiology and biogeochemistry of the geothermal systems in Yellowstone Lake. At the Great Lakes WATER Institute of the Univ. of Wisconsin-Milwaukee we are currently analyzing a fragment of one of the Bridge Bay	

TOPIC	TITLE	DESCRIPTION	CATALOG #
Geologic Resources	Volcano Emissions	Survey and characterize carbon dioxide emissions from Yellowstone soils and thermal areas in order to identify possible areas of anomalous degassing from depth and to provide a baseline with which to compare future surveys of carbon dioxide in the event of volcanic unrest.	
Geologic Resources	Arsenic Biogeochemistry in Yellowstone National Park	Our work will focus on geochemical and microbiological processes that influence the speciation and behavior of arsenic in thermal environments. Given the toxicity and potential negative impacts that As may have on biota in non-park environments, the thermal springs represent a potentially informative model system to begin to understand how microbiological life forms metabolize or detoxify As	
Geologic Resources	The search for microbial biomarkers in terrestrial deposits	The primary purpose of this investigation is to evaluate the fossilization process and the potential for a long term record of the microbial life that exists associated with hot springs and their carbonate (travertine) and siliceous (siliceous sinter) deposits.	
Geologic Resources	Operation And Development Of An Earthquake And Volcano Information System At Yellowstone (YSGN) And Ancillary Research on the Geodynamics of the Yellowstone Hotspot	The primary objectives of the Yellowstone earthquake and volcano information system is to operate seismic and GPS networks, the Yellowstone seismic and GPS networks (YSGN), necessary to monitor seismicity and ground deformation that may be related to volcanic, hydrothermal and tectonic earthquake activity	
Geologic Resources	Snow Pack on Northern Range	Evaluate variability of snow pack across YNP with emphasis on northern range and determine sinking depths of different bearing pressures on different snow conditions	YELL-CLI-002
Geologic Resources	Geochemistry, biochemistry, and stable isotope systematics of sublacustrine hydrothermal vents in Yellowstone Lake	The objectives of this study are to understand hydrothermal processes in sublacustrine hydrothermal vents in the context of the Yellowstone ecosystem and subaerial hydrothermal systems in and around Yellowstone National Park. In particular, we are using chemical composition, especially minor and trace elements and stable isotopes (H, C, N, O, and S), to understand processes of hydrothermal mineralization and to track potentially toxic and nutrient elements from hydrothermal vents into the micro- and macro-fauna of Yellowstone Lake and the Greater Yellowstone ecosystem.	
Geologic Resources	Chloride Flux Monitoring	Monitor chloride levels in major drainages as they leave the park to measure heat loss from the hydrothermal system	YELL-VOL-005,
Geologic Resources	Monitor Old Faithful Geyser	Monitor eruptions and intervals	
Geologic Resources	Monitor Vandalism to Geothermal Features	Monitor and clean geothermal features in the Upper, Midway, and Lower basins	YELL-MAN-037
Geologic Resources	Monitor selected features in the Upper, Midway, Lower Geyser Basins, Firehole Lake Drive, and the Norris Basin	Developing program under the auspices of the Geothermal Monitoring Plan	
Geologic Resources	Biogeochemistry of hydrothermal hot springs	Investigate geochemical variations in microbial mats, pore waters, siliceous sinters and geyserites at different hot springs and thermal drainages in the Park	
Geologic Resources	Geochemical and geophysical investigations of mine impacts and watersheds, Yellowstone National Park	The fundamental goals of this project are to contribute to the understanding of the complex geochemistry of the Soda Butte Creek watershed, and to investigate the impact of mining activities near the creek's headwaters. This is accomplished through: 1) building a long-term database documenting seasonal variations in stream chemistry and metal concentrations in stream waters and sediments, and 2) delineation of shallow subsurface features in the Soda Butte Creek floodplain.	

TOPIC	TITLE	DESCRIPTION	CATALOG #
Geologic Resources	Absolute gravity and crustal deformation in the Yellowstone Caldera	The primary objective to establish temporal absolute gravity and height changes in the Yellowstone caldera, and apply these measurements to constraining models for the sub-surface volcanic and magmatic sources of the caldera. Our gravity/GPS measurements will be integrated with regional GPS and/or SAR interferometric observations of deformation to model the sub-surface sources of the inflation/deflation of the resurgent domes (Sour Creek and Mallard Lake) within the caldera.	
Geothermal Resources	Thermal Feature Inventory	Field survey of feature location, temp. ph, conductivity, photos, description	YELL-VOL-006
Geothermal Resources	Thermophile Inventory		YELL-MAN-036
Microbiology	Determination of in situ growth rates of filamentous sulfur-oxidizing bacteria in a hydrothermal vent field in Yellowstone Lake	Determine the specific growth rate of cells replicating within filaments of Thiothrix-like, sulfur-oxidizing bacteria that have attached to metal coupon surfaces positioned in a hydrogen sulfide gradient above a hydrothermal vent. Using published conversion factors, we will describe the chemosynthetic or mixotrophic biomass production of filamentous sulfur-oxidizing bacteria attached to coupons at different hydrogen sulfide concentrations and temperatures.	
Microbiology	Molecular and Functional Ecology of Hot Spring Photosynthetic Mats	The project combines modern microbiological, molecular biological, and ecophysiological methods for studying the microbial ecology of photosynthetic hot spring mats. The goal is to gain a better understanding of the structure and function of the photosynthetic community in hot spring microbial mats	
Microbiology	A Survey of Pilobolus in YNP	Objectives 1. To obtain isolates of Pilobolus to examine for differences in DNA sequences and cellular short chain fatty acid composition. 2. To compare isolates from various locations by contrasting morphological characters to DNA sequences and short chain fatty acids. 3. To analyze and compare nucleic acid sequences in the various isolates to compare and contrast taxa. 4. To analyze and compare cellular short chain fatty acids in the various isolates to compare and contrast taxa. 5. To study the characteristics that can be used to identify isolates.	
Microbiology	Bacterial Diversity of Thermophilic Photosynthetic Bacteria	The main objective of this research is to discover and isolate laboratory cultures of anoxygenic (non oxygen-evolving) photosynthetic bacteria from thermal environments. Photosynthetic bacteria are model organisms for the study of basic problems in photosynthesis and thermophilic phototrophs are very desirable because of their thermostable photosynthetic machinery.	YELL-VOL-010
Microbiology	Geochemical Constraints on the Ecology of the Deep Lineages within the Bacteria and Archaea	1. Determine the microbial diversity and geochemistry associated with high temperature thermal springs in YNP;2. Study the ecology of microbial communities inhabiting YNP thermal springs	
Microbiology	Characterization of the microbial rhizosphere population of acid and thermotolerant grasses associated with hot springs and microbial diversity in thermal soils in YNP	To study the diversity and identification of the thermophilic and acidophilic organisms associated with thermophilic plants located in YNP. We are also very interested in examining the diversity of the microbial community that thrives in select thermal soil locations	
Microbiology	Isolation and chartization of thermophilic viruses from Yellowstone National Park	To isolate and characterize thermophilic viruses from the thermal features of Yellowstone National Park	
Microbiology	Survey Of Yellowstone Hot Springs for Green Sulfur Bacteria	(1) To survey selected hot springs in Yellowstone National Park for the presence of green sulfur bacteria (GSB). (2) To further characterize and possibly isolate organisms whose 16S ribosomal gene sequences indicate that they may be deeply branching relatives of green sulfur bacteria from selected Yellowstone hot springs.	

TOPIC	TITLE	DESCRIPTION	CATALOG #
Microbiology	Bacteria living at low pH and high temperature	The main objective is to examine high temperature and low pH springs to find new (i.e. previously undescribed) hyperthermophiles and develop methods to isolate and culture them	
Microbiology	The search for thermophilic Protozoa in Yellowstone National Park	The goal of this research is to identify thermophilic Protozoa in Yellowstone National Park	
Recreational Use	Stocksite Monitoring	Monitor the level of graze utilization at about 40 popular stocksites	YELL-REC-001
Recreational Use	Overnight Backcountry Visits	Track the number of use nights and distribution of overnight backcountry campers	YELL-REC-003
Vegetation	Wetlands mapping	Map wetlands along the Grand Loop Road in conjunction with Federal Highways Projects	YELL-WET-001 YELL-GIS-069
Vegetation	Rare Plant Surveys	Primarily associated with construction, but some a priori work (e.g. Ross' bentgrass and Yellowstone Sand Verbena	
Vegetation	Monitor Exotic Plants	Done in conjunction with Exotic Plant Control; also as part of the Inventory Project	YELL-ESP-001
Vegetation	Assessment of Land cover changes in the upper snake river plain and Greater Yellowstone Ecosystem	ground truthing remote sensing assessments	YELL-BOT-025
Vegetation	Non-Native Plant Monitoring	To complete several non-native monitoring projects initiated in Yellowstone since 1995. That included a re-survey of 60 sites established across the park in 1995 and 1996 which were used to assess native and non-native vegetation.	YELL-ESP-016
Vegetation	Cross-Boundary Plant Invasions in Protected Areas: The Case of West Yellowstone Area	1) Determine susceptibility of plant communities to invasion at the landscape scale in the interface between Gallatin NF and Yellowstone NP. 2) Determine both forest edge effects on alien plant invasions and biodiversity patterns, contrasting natural and human disturbances. 3) Determine the invasive strategy of Linaria vulgaris Mill. at multiple spatial scales in the study area and characterize its potential to invade areas in relation with disturbance types and regimes.	YELL-ESP-022
Widlife-predator	Cougar-wolf relationships	Document direct and indirect interactions between wolves and cougars in northern YNP	
Widlife-predator	Lynx Presence and Distribution	Document presence & distribution of Lynx in YNP	YELL-WM-106, YELL-TEA-002
Wildlife-birds	Bald Population and Recruitment Monitoring	Ground and aerial surveys(3) to monitor number of active nests and eaglets fledged	YELL-ORN-003, YELL-ORN-015
Wildlife-birds	Peregrine Falcon Population and Recruitment Monitoring	Ground (require 3 visits) and aerial surveys to monitor number of active eyries and peregrines fledged	YELL-ORN-009 YELL-EM-003
Wildlife-birds	Osprey Population Monitoring	Ground and aerial surveys(3) to monitor number of nest attempts and production	YELL-ORN-003 YELL-ORN-005, YELL-ORN-011, YELL-ORN-012
Wildlife-birds	Trumpeter Swan Population and Recruitment Monitoring	Ground, weekly snowmobile and 1 aerial surveys to monitor number of swan nesting attempts and cygnet survival	YELL-ORN-006 YELL-ORN-004, YELL-ORN-008,
Wildlife-birds	Molly Islands colonial nesting bird surveys	Ground and aerial monthly surveys to monitor nesting attempts by white pelicans, double-crested cormorants, California gulls, and Caspian terns on the Molly Islands	
Wildlife-birds	Common Loon population monitoring	Three aerial surveys to monitor nest attempts and fledging	
Wildlife-birds	Breeding bird surveys	Three breeding bird surveys are conducted along established transects each year	YELL-ORN-001

TOPIC	TITLE	DESCRIPTION	CATALOG #
Wildlife-birds	Glacier Boulder Route Survey	Documents birdlife found exclusively in lodgepole pine forests away from roads.	
Wildlife-birds	Christmas Bird Count	Local winter monitoring of birds as part of nationwide survey	
Wildlife-birds	International Migratory Bird Count	1 day count to monitor the pulse of spring bird migration.	
Wildlife-birds	Relating Avian Abundance and Diversity to Human Disturbance Regimes via Hyperspectral Imaging	1)Identify areas of significant avian abundance diversity within riparian zones on the Northern Range. 2)Identify areas supporting amphibian breeding, foraging, and dispersal activities within riparian zones on the Northern Range. 3)Relate hyperspectral imaging data to patterns of habitat, avian, and herptile abundances and distribution. 4) Relate diversity and abundance patterns to anthropogenic disturbance regimes within and between drainages	
Wildlife-general	Wildlife Disease Monitoring	Collection of animal parts to develop baseline levels of disease occurrence	
Wildlife-general	Spring carcass surveys	Firehole, Norris, Heart Lake, Northern Range	YELL-WM-010,
Wildlife-general	Roadkill wildlife	Keep track of wildlife killed by vehicle strikes	YELL-WM-011
Wildlife-general	Rare Mammal Monitoring	Track rare mammal sightings	YELL-TEA-001,
Wildlife-Invertebrates	The Mosquitoes of Yellowstone National Park, a Study of Their Species and Their Biology	An ongoing study of the mosquito species to determine species present and their biology	
Wildlife-mesocarnivores	Beaver Presence / Absence	Ground surveys by foot and horseback to search all riparian corridors and park lakes for old, recent and active beaver sign (lodges, caches, tracks, cut stumps, canals, and dams) and sightings.	YELL-WM-046,
Wildlife-mesocarnivores	The Dietary and Foraging Ecology of the Yellowstone River Otter: An Umbrella Species for Aquatic Systems	clarify the ecological role of native vs. non-native fish species on Yellowstone river otters by comparing otter populations on two lake systems in YNP	YELL-WM-118 YELL-WM-119
Wildlife-predator	Wolf Capture	Wolf Population and Distribution Monitoring	YELL-WM-023
Wildlife-predator	Genetic Study of Wolves		YELL-WM-126
Wildlife-predator	Grizzly Bear Population Monitoring	ecosystem-wide; includes bear sightings, counts of females with cubs, observation overflights, Home ranges, distribution, food habits, habitat use and mortality monitoring	YELL-WM-065 YELL-WM-024
Wildlife-predator	Human-Bear Conflict Report	Track human-bear conflicts throughout the Greater Yellowstone area	YELL-WM-013
Wildlife-predator	Physiological stress responses, aggression and social dominance in Yellowstone wolves	1. Determine factors that affect stress hormone levels(glucocorticoids) in free-ranging wolves. This includes behavioral, ecological and anthropogenic influences.;2. Relate stress physiology to survival and reproduction.;3. Relate stress physiology to social status.	
Wildlife-predator	The Effect of Environmental Variability on Grizzly Bear Habitat Use	The overall design of this project is to utilize existing data, expertise and newly collected data from advanced technologies to evaluate the impact of anthropomorphic influences on grizzly bear (Ursus arctos horribilis) habitat selection. Initially, this study will have three areas of emphasis: 1) To evaluate potential relationships between habitat use and road density. 2) To evaluate potential relationships between habitat use intensity and types of human activity. 3) To evaluate potential relationships between habitat selection and land management status.	
Wildlife-predator	Grizzly & Black Bear Genetic Diversity	Monitor Grizzly and Black bear genetic diversity in GYE	YELL-WM-112
Wildlife-predator	Study of Grizzly Bear Behavior and Genetics	Continuation of a long term study of grizzly bear behavior and the use of nuclear DNA markers to determine genetic diversity and population estimates	

TOPIC	TITLE	DESCRIPTION	CATALOG #
Wildlife-predator	Wolf Population Dynamics		YELL-WM-005 YELL-WM-022
Wildlife-ungulate	Bighorn Sheep Population Monitoring (too many)	Once-a-year aerial sheep count	YELL-WM-027 YELL-WM-036, YELL-WM-048, YELL-WM-049
Wildlife-ungulate	Mountain Goat Population Monitoring	Once-a-year aerial goat count	YELL-MAM-011,
Wildlife-ungulate	Northern Range Elk Population Monitoring	Once-a-year aerial elk count	YELL-WM-043 YELL-WM-042, YELL-WM-044, YELL-WM-108
Wildlife-ungulate	Elk classification	Once-a-year aerial survey to assess elk cow-calf ratios	YELL-WM-041
Wildlife-ungulate	Bison Population Monitoring	Monthly/quarterly aerial surveys to count bison	YELL-WM-035 YELL-WM-062, YELL-WM-068,
Wildlife-ungulate	Pronghorn Population Monitoring	Late-winter and late-summer one-day aerial counts/classifications and weekly ground monitoring during winter	YELL-WM-001 YELL-WM-045, YELL-WM-077, YELL-WM-069
Wildlife-ungulate	Mule deer Population Monitoring	One-day helicopter survey in spring and classification in winter	YELL-WM-124 YELL-WM-033, YELL-WM-034, YELL-WM-039
Wildlife-ungulate	Post-burn resource selection, physiological condition, and demographic performance of elk	The primary objective of this research is to evaluate the consequences of the 1988 fires on elk resource selection. Selection is being quantified for populations and individuals at multiple scales ranging from selection of patches within the landscape mosaic to selection of forages and plant parts within patches	YELL-WM-057 YELL-WM-037
Wildlife-ungulate	Winter recreation effects on wildlife in Yellowstone National Park	Our objective was to assess effects of winter recreation on wildlife populations in the Madison-Firehole-Gibbon drainages of Yellowstone National Park. We examined elk and bison distribution in relation to the winter road system, behavior, and stress hormone levels, along with winter season human activity types and levels	
Wildlife-ungulate	Development of Aerial Survey Methodology for Bison Population Estimation in YNP	Objective is to develop aerial survey methodologies for statistically rigorous estimation of the bison population in the Yellowstone area that will that will have sufficient power and precision to detect demographic trends	YELL-WM-062
Wildlife-ungulate	Epidemiology and Pathogenesis of Brucellosis in Yellowstone National Park Bison	Determine the natural course of brucellosis in free-ranging bison. Determine modes of transmission. Provide information on the prevalence of infection and abortion.	
Wildlife-ungulate	Sagebrush ecology and ungulate relationships	1.) To determine the current status of the sagebrush-shrub community on the northern Yellowstone mule deer winter range; 2.) Determine the importance of the sagebrush community to wintering mule deer and elk	
Wildlife-ungulate	Bison Monitoring on Groomed winter roads	Snowmobile, groomer & camera surveys completed annually 1997-8 to present. Project assesses how bison use groomed winter roads.	YELL-WM-121
GRAND TETON NATIONAL PARK			
Air	Air Quality Monitoring	Participate in the NPS ARD passive ozone monitoring program	Funded GRTE-AQU-001
Amphibians	Amphibian Management (Deb Patla)	Select a smaller subset of sample areas to be surveyed annually during the breeding season so that trends in annual variation in numbers and breeding success can be documented.	Planned, Funded GRTE-HER-001

TOPIC	TITLE	DESCRIPTION	CATALOG #
Bald Eagles	Bald Eagle Management	Monitor territorial occupancy and nest productivity at all nests annually. Territorial occupancy surveys should take place during late February. Breeding status surveys, to check for incubating adults, should take place in April. Additional nest status checks should take place during late May/early June to determine approximate age and number on nestlings, and to plan banding activities. Finally, the last nest status check should be conducted around mid-July to document productivity	GRTE-ORN-010
Birds	Breeding Bird Survey	Colter Bay Breeding Bird survey annually for contribution to the national database.	GRTE-ORN-011
Black and Grizzly Bears	Bear Management Plan Implementation	Collect visitor's and employees' observations of bear encounters on official observation report forms. Compile in a database to be maintained by the office of S&RM. Monitor any human/bear incidents that involve conflict resolution and take measures to solve the associated problem.	GRTE-WM-44, GRTE-WM-57
Black and Grizzly Bears	Bear Attractant Storage	Conduct bear attractant storage facilities inventory, on a Park wide basis, at least every 3 years. Problems that are identified should be prioritized and resolved. Highest priority would be given to problems in the grizzly bear recovery area and those that may represent a significant threat to human safety.	GRTE-WM-48
Bison	Bison Status and Research	Monitor disease status, reproduction and seasonal movements of bison.	GRTE-WM-41
Bison	Bison Monitoring	Monitor the demography, movements, and distribution of the Jackson bison herd. Maintain a sample of radio-collared females to determine movements and distribution. Conduct weekly aerial surveys to document calving in time and space. Conduct ground and aerial winter distribution, sex and age classification, and population census surveys.	GRTE-WM-35
Elk	Elk Management	Continue to gather age distribution data from elk harvested during the annual reduction. Data will be compiled, added to the interagency Jackson elk database, and included in the Park's annual report to the Jackson Hole Cooperative Elk Studies Group.	GRTE-WM-54
Elk	Elk Monitoring	Conduct summer age and sex classifications, and expand classifications to include representative areas from throughout the Park.	GRTE-WM-58
Elk	Elk Monitoring	Conduct aerial surveys of elk on summer ranges throughout the Park every 3 years to arrive at annual population estimates..	GRTE-WM-36
Elk	Elk Reduction	Compile hunt statistics annually to include age class and sex of elk killed, time period, permit type, hunt area and nearest landmark to kill site. Enter all kill data into a digital database and periodically review harvest patterns and trends. Monitor hunter behavior, numbers and patterns to assure that hunting conditions remain within a reasonable margin of safety.	GRTE-WM-40
Elk	Elk Reduction	Cooperate and assist with USDA-APHIS, the State of Wyoming, and other agencies during animal disease monitoring programs, specifically as this relates to acquiring needed biological specimens that can be gathered from harvested elk.	GRTE-WM-38
Flora	Research and Monitoring	After completion of any treatment, periodic monitoring must be done to evaluate the effects of the treatment. Monitoring will be the responsibility of the person initiating the pest control action.	Funded GRTE-IPM-001
Flora	Tree Hazard Management	Annual surveys should be performed within all developments with written reports filed in the office of S&RM. Hazard tree surveys should be expanded into moderate to low risk areas on a three to five year rotation.	Funded GRTE-MAN-003
Grizzly Bear Management	Cumulative Effects Model	Monitor Park attributes documented contained within the CEM GIS data for significant changes (fire, landslides, etc.) that would affect CEM results. Modify the data base accordingly on an as-needed basis.	YELL-WM-106

TOPIC	TITLE	DESCRIPTION	CATALOG #
Grizzly Bear	Grizzly Bear Management	Gather, record and store all grizzly bear sightings from the Park and Parkway, as well as any received from areas adjacent to the Park. Investigate and verify sightings as needed. Notify the IGBST immediately after any sow with cubs are verified.	GRTE-WM-44, GRTE-WM-57
Great Blue Heron	Great Blue Heron Management	Monitor all historical rookery sites and search for new ones on an annual basis. Nest occupancy and productivity of active rookeries should be determined in mid-June and early and mid-July. A second survey should be undertaken in July due to the difficulty in observing some of the nests and their disparate phenologies.	GRTE-ORN-007
Lynx	Lynx Management	Investigate all the reports of lynx or their sign and attempt to verify using trained staff. Verified observations will be recorded on Natural History Field Observation cards and stored in a wildlife observation database.	GRTE-WM-51
Mountain goat	Mountain Goat Management	Monitor status of mountain goats in conjunction with bighorn sheep surveys. Encourage the reporting of mountain goat observations by Park staff, particularly backcountry rangers. Reported observations of mountain goats would be investigated by S&RM staff for verification. Verified observations would be converted to a computerized database compatible with GIS.	GRTE-WM-55
Mountain Lion	Mountain Lion Management	Investigate all reports of mountain lions or their sign and attempt to verify using trained staff. Verified observations will be recorded on Natural History Field Observation cards and stored in a wildlife observation database.	GRTE-WM-52
Neotropical Migratory Birds	Neotropical Migratory Bird Conservation Program	Perform point counts and mist netting activities to monitor trends in bird population abundance at the Beaver Creek hazard fuel reduction site. The control plots will provide information regarding neotropical bird status in old growth sub-alpine fir forest types.	GRTE-ORN-004
Osprey	Osprey Management	Conduct ground and/or boat surveys to gather more specific information such as hatching of fledging dates, causes of nest failures, and nest site characteristics. Survey data to be recorded on NPS Raptor Survey cards. Nest site characteristics would be recorded on NPS Raptor Nest/Eyrie Record cards. Nest locations would be mapped.	GRTE-ORN-005
Pronghorn	Pronghorn Management	Record and maintain pronghorn sightings in the Park's wildlife observation files. Record all known mortality.	GRTE-WM-42
Sage Grouse	Sage Grouse Status	Perform annual breeding ground surveys. Monitor all current and historical leks. Conduct aerial surveys of potential habitat.	GRTE-WM-46, GRTE-WM-49
Trumpeter Swans	Trumpeter Swan Management	Monitor territorial occupancy and nesting success of trumpeter swans within the boundaries of GRTE and JODR. Visit all potential territories weekly through June to identify occupancy and nesting attempts. Determine when hatching should occur and monitor nest sites more frequently to determine when cygnets hatch, number of cygnets and number of unhatched eggs. During the course of monitoring cygnet survival, determine how many cygnets survive to fledging. Work with WGFD and Bridger Teton NF to insure all territories in the valley are monitored. Weekly surveys to quantify use of staging and molting area will be preformed at Two Ocean and Emma Matilda Lakes, Jackson Lake near Third Creek confluence, Cow Lake and Half Moon Lake. Prepare thematic maps of trumpeter swan wintering, nesting and security habitat for adding to the GIS database. Encourage employees and visitors to report swan observations and compile this information into the wildlife observation database. Identification of collared individuals will be verified and reported to appropriate agency officials. Cooperate with the USFWS in conducting Fall and mid-winter Tri-state population census.	GRTE-ORN-003
Whooping Crane	Whooping Crane Management	Reported observations of whooping cranes should be investigated by S&RM staff for verification. Verified observations would be recorded on Natural History Field Observation cards and stored in a wildlife observation database.	GRTE-ORN-008

TOPIC	TITLE	DESCRIPTION	CATALOG #
Wolves	Wolf Monitoring	Monitor wolf presence, distribution, and fecundity for dens that occur in the Park, collaborating with FWS on movements (i.e. radio-tracking), document cattle depredations.	GRTE-WM-45
Wolverine	Wolverine Management	Investigate all reports of wolverine or their sign and attempt to verify using trained staff. Verified observations will be recorded on Natural History Field Observation cards and stored in a wildlife observation database.	GRTE-WM-53
Water	Impacts of High Human Use in the Backcountry	Collect samples from surface waters throughout Garnet Canyon and the Hidden Falls areas to quantify the magnitude of potential water quality problems and to delineate the boundaries of the problem. Samples will be tested for fecal coliform, giardia and other bacteria known to cause human health problems. Samples will also be collected from backcountry areas where little to no human use occurs to establish a baseline of natural variability of water quality.	Funded GRTE-WQ-001
Water	NAWQA	Participate in the National Water Quality Assessment Monitoring managed by the USGS	Funded GRTE-WQ-005
Water	Snake River Pit	Conduct ground water monitoring in association with the rehabilitation of the Snake River Gravel Pit	Funded GRTE-WQ-002
Water	Ground Water Monitoring	Monitor Park groundwater resources to comply with WY DEQ regulations	Funded Not in Dcat
Water	Snake River Tributaries Synoptic Study	Monitoring of 5 Snake River tributaries funded by the WRD through the Natural Resource Challenge.	Funded GRTE-WQ-003
Water	Snow Pack Distribution Study	Collect measurements at 10 snow courses in and adjacent to GRTE (BOR). Collect data at 31 supplemental sites and one snow course. Send data to MSU for analysis.	Funded GRTE-WQ-006
BIGHORN CANYON NATIONAL RECREATION AREA			
Botany	Monitoring Vegetation in the Pryor Mountain Wild Horse Range	These data were collected during June, 1994, for a project designed to monitor vegetation conditions at selected sites in the Pryor Mountain Wild Horse Range (PMWHR). The overall objective of the research was to monitor vegetation conditions in a number of plant communities in the PMWHR.	BICA-BOT-007
Botany	Major Vegetation Types Found in the Bighorn River Floodplain Study Area in Bighorn Canyon NRA	Changes in riparian vegetation mosaic during the years of 1938 through 1988 were studied along the Bighorn River near Lovell, Wyoming. The results revealed a decline in Populus deltoides woodland area and an increase in shrubland area, particularly shrublands dominated by Tamarix chinensis and Rhus trilobata. Major causes for the changes are discussed and future changes are predicted. These data are descriptions of the individual vegetation types identified through this study.	BICA-BOT-014

TOPIC	TITLE	DESCRIPTION	CATALOG #
Botany	The Proportion of Land Area within the Bighorn Canyon National Recreation Area Covered by the Different Vegetation Types	The ecology of terrestrial vegetation in the Bighorn Canyon National Recreation Area (BCNRA) was studied during the period of 1984 - 1986. Seventy-five stands, distributed throughout the BCNRA, were sampled for plant species cover and various environmental characteristics. A vegetation classification and map were developed, the data were analyzed using gradient analysis techniques, and the results were synthesized with those from other relevant studies in the region. All types except marshes and agricultural land are discussed in this report, with the discussion focusing on adaptations of the dominant plant species, environmental factors affecting the distribution of each vegetation type, vegetation changes that have occurred and can be expected to occur in the future, certain aspects of weed ecology, and characteristics of the vegetation mosaic along the north-south axis of the Recreation Area. The riparian vegetation appears to be changing most rapidly, due in large part to flood control on the Shoshone and Bighorn Rivers. The suppression of fires and floods, combined with grazing and the creation of mudflats by fluctuating Bighorn Lake water levels, have produced ideal conditions in the riparian zone for the invasion of various exotic plants, salt cedar in particular.	BICA-BOT-003
Climatology	Yearly Precipitation data at Soreson Ranch between 1981-to-1994	Monthly Precipitation readings at Sorenson Ranch.	BICA-CLI-001
Climatology	Hillsboro RAWS Fire Weather Station	BICA maintains a NIFC sponsored RAWS Fire Weather Station located northwest of Barry's Landing. Data is collected hourly and includes precipitation, wind speed and direction, temperature and relative humidity, fuel temperature and moisture, and atmospheric conditions such as barometric pressure and solar radiation and is archived at several interagency fire dispatch centers and National Weather Service (NWS) regional climate centers.	
Fisheries Management	Angler Creel Reports	Data on fish numbers, size, species, and hours fished in BICA. Water temperature and quantity information.	BICA-FM-002
Ornithology	Christmas Count Lists for Kane, WY	Kane, WY Christmas Bird Count list of species. Members of the Audubon Society conduct this bird count on Yellowtail every winter since 1990.	BICA-ORN-002
Ornithology	Breeding Bird Surveys and Other Wildlife Sightings	Data on breeding birds and bird observations	BICA-ORN-003
Water Quantity	Bighorn Lake Elevation Record	Water quantity in Bighorn Lake (1978-1989), Bighorn Canyon.	BICA-WQNT-001
Water Quantity	Water Temperature log for Barry's Landing	Water temperature and quantity information.	BICA-WQNT-002
Wildlife Management	Interspecific Behavioral Interactions Among Bighorn Sheep, Mule Deer, and Feral Horses in BCNRA and Pryor Mountain Wild Horse Range	These data are one set of results from a study done from September of 1992 through February of 1996 on competitive interactions among bighorn sheep, feral horses, and mule deer in Bighorn Canyon National Recreation Area (BCNRA) and Pryor Mountain Wild Horse Range. These data were collected to determine if behavioral interactions among bighorn sheep, mule deer, and feral horses influence distribution or habitat patterns with a hypothesis that there is no difference in distribution given the presence or absence of another species.	BICA-WM-010
Wildlife Management	The Bighorn Sheep of Bighorn Canyon NRA and Pryor Mountain Wild Horse Range: Ecological Relationships and Management Recommendations	The Bighorn Sheep of Bighorn Canyon NRA and Pryor Mountain Wild Horse Range: Ecological Relationships and Management Recommendations	BICA-WM-022
Wildlife Management	Summary of Vegetation Dynamics at the Pryor Mountain Wild Horse Range, 1992-1996.	Summary of vegetation dynamics at RMWHR, 1992-1996.	BICA-WM-031

TOPIC	TITLE	DESCRIPTION	CATALOG #
Wildlife Management	Manager's Summary-Ecological Studies of the Pryor Mountain Wild Horse Range, 1992-1997	Collection of studies and papers that provide a synthesis of key findings of the landscape-scale, interdisciplinary studies of the effects of wild horses and native ungulates on a rugged, mountain ecosystem.	BICA-WM-030
Wildlife Management	Pheasant Crow Counts	This is the most effective method of monitoring pheasant populations on Yellowtail. The WYG&F conducts the counts every spring to obtain a population index (as opposed to population numbers) in order to assess trend. They were started in 1969 and conducted every year through 1985, discontinued until 1994 and discontinued again until last spring (2003).	
Wildlife Management	Winter Bald Eagle Survey	The BLM conducts a survey for Bald Eagles on the Shoshone River each winter.	
Wildlife Management	Pryor Mountain Wild Horse Range Monitoring	The BLM oversees ongoing monitoring efforts of the Pryor Mountain Wild Horse Range and the herds.	